

REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 9, 10, 12-18, 21, 22, 24-28, and 30-37 are currently pending. Claims 23 and 29 have been cancelled without prejudice or disclaimer; Claims 9, 10, 12-17, 21, 24-27, 30, and 31 have been amended; and Claims 32-37 have been added by the present amendment. The changes and additions to the claims are supported by the originally filed specification and do not add new matter.

In the outstanding Office Action, Claims 9, 10, 12, 13, 15-18, 22, 25, and 28 were rejected under 35 U.S.C. § 102(a) as being anticipated by U.S. Patent No. 6,380,518 to Shirakawa et al. (hereinafter “the ‘518 patent”); and Claims 14, 15, 23-27, 29, 30, and 31 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the ‘518 patent in view of U.S. Patent No. 3,750,620 to Eversteijn et al. (hereinafter “the ‘620 patent”).

Amended Claim 9 is directed to a processing apparatus for forming a film using atomic layer deposition (ALD), comprising: (1) a process chamber, an interior of the process chamber being maintained airproof so as to be exhausted to a vacuum; (2) a gas supply section provided to said process chamber for supplying a predetermined gas into said process chamber; and (3) an exhaust opening provided to said process chamber so as to face said gas supply section and connected to exhaust means for exhausting the interior of said process chamber, wherein said process chamber has a gas flow passage extending from said gas supply opening to said exhaust opening, and wherein said gas flow passage has a transverse cross-sectional area with at least a width that decreases in inverse proportion to a distance from said gas supply opening along said gas flow passage. The changes to Claim 9 are supported by the originally filed specification and do not add new matter.¹

¹ See, e.g., page 7, lines 21-27; and page 8, lines 11-14 of Applicants’ specification.

Regarding the rejection of Claim 9 under 35 U.S.C. § 102(a), the '518 patent is directed to a heat treatment apparatus and substrate processing system. In particular, the '518 patent discloses providing a small heat treatment apparatus capable of heating a substrate uniformly, while preventing particles from being attached to the substrate.² The '518 patent discloses that a wafer coated with photoresist is placed into a chamber, and that when a temperature detected by a sensor 97 is beyond an acceptable range, the power supply to a heat 96 is controlled or a flow amount and rate of the air (gas) sent from the pipe 64 toward the hotplate 58 are controlled. The '518 patent discloses that subsequently, operations of the gas supply system 91 and the exhaust system 92 are individually initiated thereby forming gaseous streams from the first lateral wall 52 toward the second lateral wall 52b.³ Further, the '518 patent discloses that even if particles are contained in gaseous streams flowing through an upper treatment space 59, neither speed loss nor stagnation of gaseous streams occurs. Thus, the '518 patent discloses that it follows that particles will not fall upon the wafer W and thus not adhere to the wafer W in the heat treatment chamber.⁴

However, it is respectfully submitted that the '518 patent fails to disclose a processing apparatus for forming a film using atomic layer deposition (ALD), comprising: a process chamber, an interior of the process chamber being maintained airproof so as to be exhausted to a vacuum. Rather, the '518 patent discloses that air is simultaneously blown out of nozzle holes of a linear pipe and exhausted through an exhaust port, to form gaseous streams above a hotplate.⁵ Further, the '518 patent is silent as to the use of atomic layer deposition (ALD). The '518 patent does not disclose a processing apparatus for forming a film using atomic layer deposition (ALD), comprising: a process chamber, an interior of the process chamber being maintained airproof so as to be exhausted to a vacuum.

² See '518 patent, column 1, lines 51-54.

³ Id. at column 10, lines 32-55.

⁴ Id. at column 11, lines 7-12; and column 15, lines 59-64.

⁵ Id. at column 10, lines 52-67; column 14, lines 49-63; and Figures 8-11, 13, 18-25, and 27.

Accordingly, it is respectfully submitted that the rejection of Claim 9 (and all associated dependent claims), under 35 U.S.C. § 102(a), is rendered moot by the present amendment to Claim 9.

Amended Claim 14 is directed to a processing apparatus for processing a substrate using atomic layer deposition (ALD), said processing apparatus comprising: (1) a process chamber having a bottom wall configured to support the substrate, an interior of the process chamber being maintained airproof so as to be exhausted to a vacuum; (2) a gas supply opening provided to said process chamber and connected to gas supply means for alternately supplying plural species of gases into said process chamber; and (3) an exhaust opening provided to said process chamber and connected to exhaust means for exhausting the interior of said process chamber, wherein said process chamber has a cross-section that has an approximately triangular shape as seen from a direction approximately perpendicular to said bottom wall. The changes to Claim 14 are supported by the originally filed specification and do not add new matter.⁶

Regarding the rejection of Claim 14 under 35 U.S.C. § 103(a), as discussed above, the ‘518 patent fails to disclose a processing apparatus for forming a film using atomic layer deposition (ALD), comprising: a process chamber, an interior of the process chamber being maintained airproof so as to be exhausted to a vacuum , as recited in Claim 9. Thus, the ‘518 patent does not disclose a processing apparatus for processing a substrate using atomic layer deposition (ALD), said processing apparatus comprising: a process chamber having a bottom wall configured to support the substrate, an interior of the process chamber being maintained airproof so as to be exhausted to a vacuum, as recited in Claim 14.

Further, it is respectfully submitted that the ‘620 patent fails to remedy the deficiencies of the ‘518 patent, as discussed above. The ‘620 patent is directed to a vapor

⁶ See, e.g., page 7, lines 21-27; and page 8, lines 11-14 of Applicants’ specification.

deposition reactor. In particular, the '620 patent discloses a reactor that is provided with members intended to pass a gas stream in the direction of the arrows 5 through the tube 2.⁷ However, the '620 patent does not disclose a processing apparatus for processing a substrate using atomic layer deposition (ALD), said processing apparatus comprising: a process chamber having a bottom wall configured to support the substrate, an interior of the process chamber being maintained airproof so as to be exhausted to a vacuum.

Thus, no matter how the teachings of the '518 and '620 patents are combined, the combination does not teach or suggest a processing apparatus for processing a substrate using atomic layer deposition (ALD), said processing apparatus comprising: a process chamber having a bottom wall configured to support the substrate, an interior of the process chamber being maintained airproof so as to be exhausted to a vacuum.

Accordingly, it is respectfully submitted that the rejection of Claim 14 (and all associated dependent claims), under 35 U.S.C. § 103(a), is rendered moot by the present amendment to Claim 14.

Claim 15, recites in part, a method for processing a substrate placed in a process chamber, an interior of the process chamber being maintained airproof so as to be exhausted to a vacuum, using atomic layer deposition (ALD), by alternately supplying plural species of gases into said process chamber from a gas supplying opening and switching atmosphere in said process chamber. The changes to Claim 15 are supported by the originally filed specification and do not add new matter.⁸

As noted above, the '518 patent fails to disclose using atomic layer deposition (ALD) and the process chamber recited in Claim 9. Thus, the '518 patent fails to disclose the method of Claim 15. Accordingly, it is respectfully submitted that the rejection of Claim 15

⁷ See '620 patent, column 4, lines 16-19.

⁸ See, e.g., page 7, lines 21-27; and page 8, lines 11-14 of Applicants' specification.

(and all associated dependent claims), under 35 U.S.C. § 102(a), is rendered moot by the present amendment to Claim 15.

Further, the '620 patent fails remedy the deficiencies of the '518 patent, as discussed above. Accordingly, it is respectfully submitted that the rejection of Claim 15 (and all associated dependent claims), under 35 U.S.C. § 103(a), is rendered moot by the present amendment to Claim 15.

Regarding the rejections of dependent Claims 24-27, 30, and 31 under 35 U.S.C. § 103(a), it is respectfully submitted that the '620 patent fails to remedy the deficiencies of the '518 patent, as discussed above. Accordingly, it is respectfully submitted that the rejections of dependent Claims 24-27, 30, and 31 are rendered moot by the present amendment to the independent claims.

Regarding the rejections of dependent Claims 23 and 29, it is respectfully submitted that the rejections of those claims is rendered moot by the present cancellation of Claims 23 and 29.

The present amendment also sets forth new Claims 32-37 for examination on the merits. New Claims 32-37 are supported by the originally filed specification and do not add new matter.⁹ It is noted that these more detailed features are not disclosed or suggested by the '518 and '620 patents.

Thus, it is respectfully submitted that independent Claims 9, 14, and 15 (and all associated dependent claims) patentably define over any proper combination of the '518 and '620 patents.

⁹ See, e.g., page 15, lines 25-27; and page 15, line 27 to page 16, line 2 of Applicants' specification.

Consequently, in view of the present amendment and in light of the above discussion, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.


Respectfully submitted,

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